

DATA 510: Data Science Capstone

Summer 2026

Instructor

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Meeting Time & Location

Days: Monday
Time: 6:00 – 10:00 PM
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Table of contents

1	Course Information	3
1.1	Instructor Student Hours	3
2	Course Details	3
2.1	Catalog Description	3
2.2	Project Logistics and Framework	3
2.3	Textbook and Materials	4
2.4	Prerequisites	4
3	Course Objectives	4
4	Student Learning Objectives	5
5	Grading Policies	5
5.1	How Your Course Grade Is Built	5
5.2	Letter Grade Cutoffs	6

5.3	Course Components (Detailed)	6
5.3.1	Professional Development Activities	7
5.3.2	Project Milestones	7
5.3.3	Stakeholder Participation (Peer PO Duties)	7
5.3.4	Project Deliverables	8
5.3.5	Project Website and Dissemination	9
5.3.6	Technical Writing Practice	9
5.3.7	Git Commit History	9
6	Class Policies	9
6.1	Late Work	9
6.2	Attendance	10
6.3	Incomplete Grades	10
6.4	Regrading	10
6.5	Classroom Conduct	10
6.6	Academic Honesty General Statement	11
7	Willamette Policies	11
7.1	Time Commitments	11
7.2	Diversity and Disability	11
8	Tentative Course Topics	12
9	Syllabus Modification Log	13



1 Course Information

1.1 Instructor Student Hours

Monday	Tuesday	Wednesday	Thursday	Friday
4:00 PM - 5:30 PM	By appointment	By appointment	By appointment	By appointment

If these times do not work for you, email me and we can find another time.

2 Course Details

2.1 Catalog Description

Over the course of the semester, you will propose, plan, and execute a real data science project. The project integrates core skills from the program and produces a portfolio piece aligned with your career goals. Projects must be consequential: they should have real or plausible impact on an organization or a broader problem. Grades reflect steady progress (milestones and participation), communication quality, and how you present and defend your work, including feedback from a panel of industry judges where applicable. Data sources must be selected and approved by the instructor within the first two weeks of the semester.

Classes will be a mix of seminar-style discussion, lectures, group work, individual mentoring and interactions with guest speakers. The particular mix of these items is likely to evolve over the course of the semester to account for the schedules of busy professionals donating their time to participate in class discussions.

2.2 Project Logistics and Framework

Team size. You may work on your capstone **individually** or in a team of **two or three** students. The course is intentionally flexible so that strong individual directions are not folded into a compromise-heavy group assignment when that would stifle passion and creativity.

Meta-project grouping. Regardless of team size, every capstone project is assigned to a **meta-project** cluster: your project is paired with **two peer projects** for the whole semester.

You are responsible for following those peers' progress closely and for providing structured feedback to them each week (and they do the same for you). That feedback loop is part of how we approximate the cross-team visibility you get in professional data science settings.

Weekly rituals. You will follow weekly **Data-Driven Scrum (DDS)** rituals for your own work (for example, backlog prioritization, iteration review, and retrospective) and participate in the equivalent touchpoints for your two peer projects so that everyone's backlog, task board, and risks stay visible within the cluster. **Standups and backlog refinement are in-class work** and should be completed by the end of the evening session; written artifacts (such as README updates) follow the deadlines in Canvas. Details of boards, artifacts, and README expectations are summarized on the companion [Project Framework](#) page.

2.3 Textbook and Materials

There is no official textbook. Various articles, podcasts, and links will be distributed via Canvas over the course of the semester.

2.4 Prerequisites

DATA 501, DATA 502, DATA 503, DATA 504

Note: A minimum grade of C- is required for this course to count toward university credit.

3 Course Objectives

1. Implementing state-of-the-art development practices to support publication and presentation of a data science project.
2. Intelligently discussing the latest developments in data science and their potential impact on organizations, the economy, and the world.
3. Proposing and defending a data science-based solution to a problem of consequence for an organization, the economy, or the world.
4. Communicating the implications of one's findings in a clear, non-technical way, both in person and in writing.
5. Demonstrating a clear understanding of data science topics and techniques in a professional interview setting.

4 Student Learning Objectives

- Navigate the job market and leverage their unique skills and talents to excel in professional interview situations. Demonstrated through completion of the professional development activities.
- Advertise themselves to potential employers, showcasing their strengths and skills in a polished and professional manner. Demonstrated through professional development activities, the GitHub pages profile, and the final write-up.
- Plan out from start to finish the major pieces of a large-scale data science research project, including estimated timelines. Demonstrated through the project proposal and later milestone deadlines.
- Execute a scheduled research plan, meeting deadlines and showcase a polished project at the end. Demonstrated through each of the milestone deadlines.
- Present research findings and the research process to technical and non-technical individuals in an interactive, verbal and visual way. Demonstrated through the professional development activities and the final presentation.
- Write up research findings and the research process in a clear and concise manner suitable for modern publication. Demonstrated through the rough and final draft write-ups.
- Work effectively with others to split workloads to be able to meet deadlines. Demonstrated through project milestones and the final presentation.

5 Grading Policies

5.1 How Your Course Grade Is Built

Your recorded scores in Canvas are combined using the weights in the table below. Each percentage is a share of your *final* course grade; together they sum to 100%. Full descriptions of each component follow the table. Rubrics and briefings for individual assignments live in Canvas.

Component	Weight
Ongoing coursework	15%
Professional development activities	
Project process and practices (includes Git workflow; see below)	
Technical writing practice	
Project milestones	35%
Project proposal	
Data summary	
Poster rough draft	
Written report rough draft	

Component	Weight
Stakeholder participation (peer PO duties)	15%
Weekly Studio Briefs (filed as a peer PO on two adjacent projects)	
Weekly Studio Critiques (filed as a peer PO on two adjacent projects)	
In-class Studio Session participation	
Meta-project reflection submissions (mid-term and end-of-term)	
Final deliverables	35%
Final poster presentation	
Final write-up	
Project website and dissemination	
Total	100%

5.2 Letter Grade Cutoffs

Cutoffs are applied after the weighted total above.

Course average	Letter
92.00 and above	A
90.00 - 91.99	A-
88.00 - 89.99	B+
82.00 - 87.99	B
80.00 - 81.99	B-
78.00 - 79.99	C+
72.00 - 77.99	C
70.00 - 71.99	C-
68.00 - 69.99	D+
62.00 - 67.99	D
60.00 - 61.99	D-
59.99 and below	F

5.3 Course Components (Detailed)

The following sections describe what each part of the grade is meant to assess. If anything here disagrees with a dated announcement or a Canvas assignment page, follow the announcement or assignment.

5.3.1 Professional Development Activities

Every other week, the first portion of class is set aside for professional development. Ruthie will have students work through a variety of tasks and situations to help ensure that students are as prepared as possible for entering the job market. Even if students are not actively looking for a new job, the tech world is a swiftly changing place, and most tech workers switch jobs multiple times over their career. All students will therefore be expected to participate.

5.3.2 Project Milestones

To keep projects on pace, and to further mimic the more consistent deadlines that are commonly found in the workplace, there are several milestones laid out for the projects over the duration of the course:

- **Project proposal.** The project proposal is a short write-up that details all the planned ideas and steps required to bring a project to fruition. This includes the research question itself, data sources to support that question, and planned statistical and machine learning analysis. While projects are free to pivot as necessary, the proposal should serve as the default fallback and act as a guiding light throughout the summer.
- **Data summary.** The data summary demonstrates that all the data necessary to answer the research question has been gathered and organized, or pipelines have been implemented that are actively gathering and organizing the data without further interaction necessary. Past this milestone, no further active work should need to be done to bring in new data.
- **Poster rough draft.** The poster rough draft is the first opportunity to submit a complete summary of your entire project. Placeholder figures are OK, but you should endeavor to have a complete story addressing all the required components of the project.
- **Write-up rough draft.** The write-up rough draft represents the first written description of the project's question, methodology, and findings. It should be written in a fashion conducive to online publishing and include sections on all of the project requirements. Past this milestone, there should be no further changes to the methodology or findings.

5.3.3 Stakeholder Participation (Peer PO Duties)

Starting in week 3, this course runs on the Data Science Studio Scrum (DS3) framework, described on the [Project Framework](#) page. In DS3 every student is both an **Owner** on their own capstone project and a **Peer Stakeholder Product Owner (peer PO)** on two adjacent capstone projects. The two peer PO assignments are published on the Peer Stakeholder PO lookup in Canvas. This component grades the work you do *as a peer PO for the two projects you support*, not the work you do as an owner of your own project.

Each week, for each project you peer-PO, you owe:

- **Studio Brief.** A written brief filed in your assigned project’s repository by **Sunday 5:00 PM** before Monday class. Names requirements, questions, and risks for the next iteration. Template lives on the Studio Session page in Canvas.
- **Studio Critique.** A written critique filed by the same deadline that assesses what the owner team delivered last iteration against your prior brief and against their charter. Template on the same page.
- **In-class Studio Session participation.** You attend the studio you are visiting that week (odd/even rotation defined on the Studio Session page) and lead the brief and critique discussion live with the owner team.
- **Meta-project reflections.** Twice per term (around **week 7** and **week 14**), submit a short structured reflection capturing what you noticed in your peer projects, what you asked, and how your feedback shifted their plan.

Rubric (per Studio Brief and per Studio Critique). Each Brief and Critique is graded on a four-point bar:

Bar	Description
Exceeds (4)	Specific, kind, actionable, tied to a visible artifact, and raises a risk the owner team had not seen.
Meets (3)	Specific and actionable, tied to a visible artifact.
Approaches (2)	Generic feedback, tied loosely to the artifact.
Insufficient (1) / Missing (0)	Late, missing, or contentless (“looks good!”).

Participation floor. Missing **4 or more** Studio Briefs or Studio Critiques over the term **caps this component at 50%** of its possible points, regardless of quality elsewhere. The intent is to make absence visible: it is the absence, not the polish, that breaks DS3 for the owner teams who depend on you.

Solo owners. The dual-role rule applies the same way to solo owners. If you are running your own project alone, you are still a peer PO on two adjacent projects and you owe the same Briefs and Critiques.

5.3.4 Project Deliverables

At the end of the semester, two major things are required:

- **Final poster presentation.** A final conference-style poster presentation will be given to peers, faculty, and representatives from industry. This is a chance to highlight the work done over the summer and to discuss a project’s findings. Poster presentations will be joint across both cohorts and happen on the last evening of classes.

- **Final write-up.** A final draft of the write-up represents the concluding version of a project's question, methodology, findings and future. It should be extensively proofread and polished, as it is the permanent record of the work the students have accomplished. It will be published online and linked to student portfolios.

5.3.5 Project Website and Dissemination

Modern tech workers and job seekers benefit from a public-facing place to showcase skills and experience. You will publish your project materials online (for example, via GitHub Pages) and link them from your portfolio as described in the assignment specifications.

5.3.6 Technical Writing Practice

To prepare you for writing your own technical report, we will do a series of writing exercises throughout the semester. These exercises will generally be done in class, incorporating small group discussions. Students who miss class on these days will only be able to receive partial credit on any make up work they submit.

5.3.7 Git Commit History

Another goal of this course is to help you learn how to use Git effectively in a collaborative environment. This includes setting up your Git repository in a timely manner and pushing regular code commits that are appropriately sized and well commented throughout the semester. You will receive weekly feedback on your commit history throughout the semester, and you will be graded on the quality of your commits (that is, how well you incorporate previous feedback) during the last five weeks of the semester. This expectation is part of the **project process and practices** component in the table above, together with other workflow requirements such as project chartering and weekly summary reports.

6 Class Policies

6.1 Late Work

I understand that sometimes things come up, and you may be unable to meet a deadline. However, deadlines commonly exist to ensure that you are in a position to achieve success in the future, and workplaces often do not have the flexibility that academics have in allowing extensions. In an effort to maintain some flexibility while still having firm deadlines, you have a **24-hour grace period** past each deadline in which you can submit without penalty. Beyond that you will lose 20% of that deliverable's worth each day. Final presentations cannot utilize

this 24-hour grace window, as we have a single class slot set aside for presentations. The writing and git assignments are also exempt from this policy.

6.2 Attendance

Class participation is a major component of how learning happens in this course. You will be responsible for making up any material or coursework you may have missed due to absence. More than three unexcused absences will result in a failing grade for the course.

6.3 Incomplete Grades

An incomplete grade will only be granted in the case of prolonged illness or family emergencies that remove the student from the campus for an extended time period during the latter portion of the semester. Under no situations will an incomplete be granted due to a student falling behind through lack of motivation, understanding, or time management skills. If you are concerned about your progress and how you are doing in the class, please come visit me! We can sort out where you are struggling and work out a plan to get you back on track.

6.4 Regrading

If you feel that your grade on any assignment is unfair, you may submit a petition for a regrade. Petitions must be received in writing via email before the start of the last class period; verbal requests will not be considered. The petition needs to make a convincing case for why a regrade is warranted, e.g. by citing relevant course materials supporting your argument. I will then make a decision about the grade, which will be final. Any attempt at haggling will be rebuffed.

I reserve the right to grant exceptions to any of these policies under extreme circumstances, at my discretion.

6.5 Classroom Conduct

As an educational institution, Willamette is committed to support the ideals and standards that help create a constructive and healthy learning community. That requires, among other things, encouraging positive classroom behaviors, discouraging disruptive classroom behaviors, and setting clear standards for both of those things.

To that end, constructive classroom behaviors are those that support learners and teachers in an environment that promotes trust, respect, and collaborative learning.

Disruptive classroom behaviors are those that undermine or interfere with the abilities to learn and teach. Clear examples of disruptive behaviors include, but are not limited to:

- Interrupting others or persistently speaking out of turn.
- Distracting the class from the subject-matter or discussion at hand.
- Making unauthorized recordings or photos of a class meeting or discussion (except as permitted as part of an Accessible Education Services-mandated accommodation).
- Any physical threat, physical, psychological, or sexual harassment, ridicule, or abusive act towards a student, staff member, or instructor in a classroom or related setting.

6.6 Academic Honesty General Statement

Cheating is defined as any form of intellectual dishonesty or misrepresentation of one's knowledge. Plagiarism, a form of cheating, consists of intentionally or unintentionally representing someone else's work as one's own. Integrity is of prime importance in a college setting, and thus cheating, plagiarism, theft, or assisting another to perform any of the previously listed acts is strictly prohibited. I will impose penalties for plagiarism or cheating ranging from a grade reduction on an assignment or exam to failing the course.

7 Willamette Policies

7.1 Time Commitments

Willamette's credit-hour policy assumes about two to three hours of out-of-class work for each hour in class. This course meets once per week for four hours, so you should plan on roughly **8 to 12 hours** of project time, reading, writing, and rehearsal outside of class most weeks (more as deadlines cluster).

7.2 Diversity and Disability

Willamette University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. Our goal is to create learning environments that are usable, equitable, inclusive and welcoming. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, please notify me as soon as possible. Students with disabilities are also encouraged to contact the Accessible Education Services office in Matthews 103 at 503-370-6737 or accessible-info@willamette.edu to discuss a range of options to removing barriers in the course, including accommodations.

8 Tentative Course Topics

Weekly topics may shift depending on class progress and guest availability. Lecture Block 1 runs 6:00 - 7:30 PM and Lecture Block 2 runs 8:00 - 10:00 PM. Deliverables are due by the end of class unless otherwise stated.

Week	Date	Lecture Block 1	Lecture Block 2	Deliverables
1	5/11	WS: Syllabus and Research vs. EDA	Project Brainstorming Session	Project Brainstorming Survey
2	5/18	WS: Technical Writing I	Project Group Topic and Team Forming	Technical Writing Output; Project Charter
3	5/25	WS: Project Framework	Project Chartering Working Session	Project Weekly Summary Report
4	6/1	PD: Alum Panel	Project Working Session	Project Weekly Summary Report; Project Proposal
5	6/8	WS: Technical Writing (with Quarto)	Data Engineering Consultations; Project Working Session	Technical Writing Output; Project Weekly Summary Report
6	6/15	PD: Identifying Companies to Target and Building a Networking Strategy	Project Working Session	Project Weekly Summary Report
7	6/22	Statistics Consultations	Project Working Session	Data Summary; Project Weekly Summary Report
8	6/29	PD: Behavioral Interview Prep	Project Working Session	Project Weekly Summary Report
9	7/6	Machine Learning Consultations	Project Working Session	Project Weekly Summary Report
10	7/13	PD: Mock Interviews I (internal practice)	Project Working Session	Project Weekly Summary Report; Poster Rough Draft
11	7/20	PD: Internal Mock Interviews and Technical Interview Prep (Everyone in Portland)	PD: Internal Mock Interviews and Technical Interview Prep (Everyone in Portland)	Project Weekly Summary Report

Week	Date	Lecture Block 1	Lecture Block 2	Deliverables
12	7/27	Project Peer Feedback Working Session	Project Working Session	Project Weekly Summary Report; Write-up Rough Draft
13	8/3	Presentation Prep Work	Peer Presentation Practice; Project Working Session	Project Weekly Summary Report
14	8/10	Poster Presentations (Everyone in Salem)	Poster Presentations (Everyone in Salem)	Final Write-up (Due 8/17)

9 Syllabus Modification Log

Date	Modification summary
5/25/2026	Added Stakeholder participation as a top-level course component at 15%; rebalanced Ongoing coursework (25 to 15) and Final deliverables (40 to 35); published peer PO weekly expectations and rubric.
5/18/2026	Rolled-up course component weights.
5/11/2026	Published and reviewed in class.